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Techdata Sheet



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NAVAL FACILITIES ENGINEERING SERVICE CENTER, PORT HUENEME, CA 93043-4328

CATHODIC PROTECTION SYSTEM INSPECTION VI

When a cathodic protection system is working properly, corrosion of the protected structure is virtually nil. However, when the cathodic protection system is not working properly, the corrosion of the structure proceeds at a rate up to the normal corrosion rate of an unprotected structure. If the cathodic protection system is periodically inspected and maintained to provide continuous protection, the condition of the protected structure can be inferred from the cathodic protection system records without the need for physical inspection of the protected structure. Thus, the high cost of inspecting buried or submerged structure surfaces can be avoided if the cathodic protection system is properly inspected and maintained.

The requirements for scheduled inspection of cathodic protection systems are given in Chapter 8 of Naval Facilities Engineering Command MO-306 "Maintenance and Operation of Cathodic Protection Systems." Each individual cathodic protection system should be inspected according to these requirements. The requirements are:

Monthly:

- Inspect rectifiers.

Quarterly:

- Measure structure to electrolyte potentials.

Annually:

- Inspect submerged anodes (waterfront structures and water tanks) for consumption.
- Inspect test stations for mechanical damage.

INSPECTION PROCEDURES

The procedures for monthly inspection of cathodic protection system rectifiers were described in NFESC Techdata Sheet (TDS) (2002-SHR) and are described in more detail in MO-306. As in all inspection programs, proper record keeping is vital. NAVFAC Form 11014-74B should be used to record the results of these monthly rectifier inspections.

The structure to electrolyte potential is the key measurement in determining proper operation of cathodic protection systems. Procedures for performing these measurements were out-

lined in NCEL TDS 93-04 and are described in more detail in MO-306. For buried structures, structure-to-electrolyte potentials should be taken at a minimum of four points within the system with one of these points being the least negative point measured in previous surveys. Assistance in establishing these test points can be obtained from the corrosion control coordinator at your geographical Engineering Field Division or Activity, from the Cathodic Protection System Center of Expertise, or from the Naval Facilities Engineering Service Center. The structure to electrolyte potential readings should be recorded on NAVFAC Form 11014-74A.

For waterfront structures, the structure-to-electrolyte potential should also be measured quarterly at a minimum of four points in the system. These measurements should be recorded on NAVFAC Form 10014-74A.

For water tanks with internal cathodic protection systems, the system usually includes a "permanent" reference electrode in the tank. The structure-to-electrolyte potential should be measured monthly during the inspection of the rectifier using the "permanent" reference electrode and recorded on NAVFAC Form 11014-74B. The performance of the "permanent" reference electrode can be checked by comparing it with a portable reference electrode of known accuracy. This is usually performed in conjunction with the annual inspection of the tank anodes as described below.

Submerged anodes on waterfront structures and water tanks are visually inspected for consumption. If the anode is suspended, it can usually be retrieved for inspection. In this case, the easiest way of determining anode consumption in most instances is to weigh the anode and

compare the weight with the original anode weight and the weight measures during previous inspections. If the remaining weight of the anode is less than that required for another year of operation, it should be replaced. When the anodes are mounted directly to the structure, or cannot be retrieved for topside inspection, divers can be used to inspect the anodes for consumption. In this case, the diver should measure the anode (length, width and thickness) to determine anode consumption.

The inspection of test stations is primarily a visual inspection for broken wires, loose contacts, and corrosion of conductors or connectors.

In addition to the minimum requirements described above, it is good practice to perform additional inspections. Whenever a buried structure is excavated for repair or in conjunction with other work, the surface of the structure should be inspected for evidence of corrosion and, if coated, for coating deterioration. If a water tank is emptied for any reason, the interior should likewise be inspected for evidence of corrosion or coating deterioration.

Good record keeping is the key to any inspection and maintenance program. In addition to the required records (Forms 11014-74A and 11014-74B), records of leaks and required maintenance on the buried or submerged systems, as well as repairs and maintenance required on the cathodic protection system should be maintained. Current drawings of underground utility systems, waterfront structures, and water tanks, as well as current drawings of the cathodic protection systems are also vital to a good overall inspection and maintenance program.

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